

BRIGHAM AND WOMEN'S HOSPITAL GOALS AND OBJECTIVES

CA-3 Obstetric Anesthesia Elective

Patient Care:

The division of obstetric anesthesia at Brigham and Women's Hospital oversees the delivery of nearly 10,000 babies per year. In addition, we provide anesthetic services for an active in-vitro fertilization (IVF) program that performs over 1500 egg retrieval procedures per year. We also provide anesthesia coverage for approximately 1000 D&E procedures for early pregnancy miscarriages, as well as other pregnancy related procedures such as post-partum tubal ligation and cervical cerclage. We also have an active in-utero fetal surgery program where we provide anesthetic care to women undergoing a variety of fetal intervention procedures. A large number of the patients we care for on the obstetric service at BWH have one or more co-morbidities and complications of pregnancy. Common obstetric problems encountered include preeclampsia, prematurity, multiple gestation, placenta previa and placental abruption. Common medical co-morbidities include obesity, cardiopulmonary disease, diabetes, hematologic, neurologic, and hepatic disease, as well as drug abuse, extremes of maternal age and other assorted medical and obstetric conditions. We supervise an active antenatal hi-risk anesthesia consultation service, where we see a variety of patients during gestation, before their presentation in labor. We use this consultation service to evaluate the various medical and obstetric problems, arrange appropriate consultations, and discuss plan of care in a multidisciplinary manner with the patient's other medical, obstetric and nursing care providers.

The residents rotating on the obstetric service begin the rotation by learning to provide basic anesthetic care to normal pregnant patients undergoing labor as well as cesarean delivery. This generally involves regional anesthesia techniques. The new residents also provide general anesthesia for the IVF patients. Once basic competencies have been established, the residents will become involved with more complex cases, such as those manifesting the co-morbidities noted above. In general, the senior residents will do the hi-risk antenatal consultations, they will preferentially perform the anesthesia for more complex cesarean deliveries, such as those where major hemorrhage or other difficulties are expected, or for the fetal surgery cases. The senior residents will also provide anesthetic care for the more complex laboring patients, such as those with morbid obesity, cardiac and pulmonary disease, and severe preeclampsia.

Medical Knowledge:

The medical knowledge expected of the resident on the obstetric anesthesia rotation varies from the basic anatomy and physiology of pregnancy to the various anatomic and physiologic derangements that characterize the most complex patients presenting to our

labor and delivery unit. We have established a guideline of the core topics and subjects to be mastered by the junior, mid-level, and senior resident. **See attachments 1, 2 and 3 for a detailed description of these topics.** The faculty instruct the residents in these topics by use of twice-daily didactic conferences, as well as bedside teaching. We emphasize reading of textbook chapters, review articles, and other basic materials for the junior residents. For the senior residents, we encourage reading of original sources, such as published research articles in major anesthetic and obstetric journals. The faculty will frequently conduct “journal-club” type discussions among the senior residents, with emphasis on insightful reading, analysis and critique of the literature. Many of the faculty in the division of obstetric anesthesia are active researchers, and serve on editorial boards of major anesthesia journals. Thus, we feel that we can give the residents a meaningful exposure to the most sophisticated literature review process possible in an academic setting.

Patient Based Learning and Improvement:

The residents on the obstetric anesthesia service will learn to develop the skills necessary to provide and manage all aspects of anesthetic care for the pregnant woman. This involves increasing levels of clinical independence and decision-making commensurate with their level of training and skill. Although an attending anesthesiologist is always present on the labor and delivery unit 24 hrs per day, every day, the residents will assume increasing levels of independence in their practice as the attending staff deems the residents to have mastered basic and mid-level skills and fund of knowledge. The labor and delivery unit at BWH is one of the busiest in the country and provides ample clinical exposure to a wide variety of clinical experiences and decision-making opportunities.

Interpersonal and Communication Skills:

The obstetric anesthesia service provides a unique opportunity for the residents to develop interpersonal and communication skills. The anesthesia service works very closely with the obstetric, midwifery and nursing services to provide a team approach to the care of our normal and complicated patients. The labor and delivery environment is often a very stressful setting, and acute emergencies are common. Moreover, it is unusual that our obstetric patients are sedated, hence this places yet another additional challenge on our residents to develop proper interpersonal and communication skills. It is not an uncommon occurrence for disagreements to occur on a variety of clinical matters among the anesthesia team and our other medical and nursing colleagues. While the attending anesthesiologist is always available to help mediate these conflicts, we allow the more advanced residents to attempt their own style of conflict mediation and resolution, where appropriate. Moreover, the skills necessary to deal with frequently stressed and “difficult” patients are uniquely developed on the obstetric rotation. There are many issues of tremendous personal sensitivity that one encounters when dealing with the obstetric patient, often involving various aspects of medical or obstetric history not

known to the patient's current partner. The ability to interview and obtain this information in an accurate yet sensitive manner is a skill that the obstetric anesthesia resident develops and hones over the course of his/her more advanced rotations on the service. Moreover, unlike the general operating room, where essentially every patient receives an anesthetic of some sort, the obstetric patient will occasionally desire a non-medicated childbirth.

On occasion, various medical or obstetric circumstances, or simply a change of mind on the part of the patient, will result in these "natural childbirth" patients receiving an anesthetic. The interpersonal skills required to properly deal with this circumstance is also a unique challenge to the obstetric anesthesiologist, and these skills are developed as the resident matures and progresses from junior to more senior resident.

Professionalism:

For many of the same reasons as expressed above, the obstetric anesthesia rotation offers the resident the opportunity to develop a sense of professionalism unrivaled by other anesthesia rotations. We insist that our residents treat our patients and other medical and nursing colleagues with respect and a sense of shared goals to provide optimal medical and obstetric outcomes as well as a cordial working environment. We recognize that discord may occur on occasion, and we encourage the residents to handle these differences of opinion with integrity and appropriate demeanor. Moreover, childbirth is a very important event in the life of a woman, unrivaled by perhaps no other event in their lives. We frequently encounter patients from diverse ethnic, cultural and religious backgrounds, and often these patients will request a variety of unique circumstances regarding the management of their labor and birth. We encourage the residents to understand these various cultural nuances, and to provide care that is foremost safe, but also sensitive to the various cultural requests. As the resident advances in the program, the more difficult and perhaps awkward cultural circumstances and requests are handled by the resident, with increasing levels of independence.

Systems-Based Practice:

The daily schedule on the obstetric anesthesia rotation includes one resident as the daily "team leader". This resident acts as the coordinator for the clinical assignments of all the other daily residents, and acts as the principal liaison between the anesthesia faculty and the various clinical issues of the day. Only the senior residents will assume this role. This resident also has some degree of oversight responsibilities for assisting the junior residents with difficult clinical cases, troubleshooting problematic issues, and interacting with the obstetric residents to co-manage the cases. In addition, we have a twice-daily set of "board rounds", where anesthesiologists, obstetricians, nurses, and midwives meet to discuss all the issues related to patients currently on the labor floor. We insist that the team leader resident attend and participate in these rounds.

We have a system of electronic follow-up notes to be entered in the hospital computer system on patients with any sort of post-anesthetic problem; the senior residents write these notes with supervision from faculty.

As noted above, the senior residents perform the antenatal hi-risk consultations, and write the consultation notes and assist with retrieval of any relevant medical records or other consultative notes.

The senior residents will be asked to participate in the morning didactic lecture schedule, giving one approximately 30-min lecture per month to the group on a topic of relevance to obstetric anesthesia.

Evaluation:

The division of obstetric anesthesia evaluates the progress of our residents on a frequent basis. During each one-month rotation, an email is sent out mid-month to the faculty with the list of rotating residents for that month, and solicitation is made for any comments, both positive and negative. The director of the service receives these comments, and counsels the residents accordingly, often in collaboration with the particular resident's faculty advisor. At the end of each month, the entire obstetric anesthesia faculty (12 physicians total) meet in person to discuss the progress of each resident. A written evaluation is prepared for each resident, and the resident is subsequently given their evaluation. Components of the evaluation include technical skills, fund of knowledge, work ethic, collegiality, and professionalism. For the senior residents, we also include an evaluation of their didactic lecture.

Specific goals for each rotation on the service (Level 1, 2 and 3)

The Level 1 outline is intended to be the foundation, based on one-month full-time specialty rotations, typically midway to late in the CA-1 or early in the CA-2 year. The Level 2 outline shows expectations for the second or third month on the service, typically at the CA-2 level. The Level 3 program includes the higher expectations an advanced two-month or more specialty rotation in the CA-3 year.

Level 1

General Issues

1. Ability to function as part of a team with anesthesia colleagues, obstetricians, nursing staff, nurse midwives, neonatologists and pediatricians to provide optimal medical, obstetric, and anesthetic care for parturients and their fetuses/neonates
2. Familiarity with the ASA and ACOG guidelines pertaining to obstetric anesthesia

Core knowledge acquisition: mastery of basic information of topics presented below:
Difference between CRNA (or nonconsultant MD anesthesiologist) and a consultant in anesthesiology:

Premise for level 1: An anesthesia consultant should have a working knowledge of the medical concepts and terminology that pertain to OB, medicine, surgery, and

neonatology, and should be familiar with the clinical challenges encountered by his/her colleagues, particularly as they relate to anesthesia or analgesia interventions in the perioperative period. (For example, a consultant should understand the anesthetic implications of third trimester bleeding in a parturient admitted to L& D).

I. Manual skills development:

- A. Goal: to learn and practice the following skills during routine cases, without an emphasis on efficiency
 - 1. Epidural catheter placement (success rate @ 70% by end of month; no more than 3 PDPH's)
 - 2. SAB placement (success rate @ 80%)

II. Physiology of pregnancy:

- A. Maternal physiology prior to labor and delivery
 - 1. Cardiovascular system:
 - a) Describe the changes that occur in the following parameters in each trimester, during labor and in the puerperium (immediate and delayed). Explain the mechanism of these changes? What is the clinical significance of each of these changes?
 - (1) CO, SV, HR, blood pressure
 - (2) Blood volume
 - b) Describe the effects of supine position on blood pressure; (aortocaval compression) and uterine blood flow. What is the clinical significance of maternal supine position prior to the onset on labor, during labor with and without epidural anesthesia?
 - 2. Pulmonary, respiratory, and airway: Describe the changes occur in the following parameters in each trimester, during labor and in the puerperium (immediate and delayed). Explain the mechanism of these changes? What is the clinical significance of each of these changes?
 - a) FRC, tidal volume, ventilatory rate, minute ventilation, alveolar ventilation: relation to progesterone
 - b) Work of breathing, airway resistance, chest wall compliance
 - c) Arterial blood gases; V/Q matching
 - 3. Gastrointestinal:
 - a) Describe the changes that occur in the following parameters in each trimester, during labor and in the puerperium (immediate and delayed). Explain the mechanism of these changes? What is the clinical significance of each of these changes?
 - (1) gastric motility, gastric emptying,
 - (2) LES tone

- b) Discuss risks of aspiration pneumonitis during each trimester, during labor and in the puerperium (immediate and delayed).
 - 4. Hematologic: Describe the changes that occur in the following parameters in each trimester, during labor and in the puerperium (immediate and delayed). Explain the mechanism of these changes? What is the clinical significance of each of these changes?
 - a) HCT
 - b) platelets, PT, PTT, fibrinogen
 - 5. Renal: Describe the changes that occur in BUN, Cr, GFR, RBF in each trimester, during labor and in the puerperium (immediate and delayed). Explain the mechanism of these changes
 - 6. Endocrine and metabolism
 - a) Describe the changes that occur in the following parameters in each trimester, during labor and in the puerperium (immediate and delayed). What is the clinical manifestations of each of these changes?
 - (1) progesterone, estrogen,
 - (2) HCG, prolactin, HPL (breast development), MSH (marked increase, first trimester; linea nigra; chloasma = mask of pregnancy)
 - (3) aldosterone, angiotensin, renin, cortisol,
 - (4) prostacyclin, thromboxane
 - b) O₂ consumption and CO₂ production
 - 7. Musculoskeletal
 - a) Describe the musculoskeletal changes that occur during pregnancy. What is the mechanism of these changes? What is their impact on
 - (1) back pain and sciatica
 - (2) performance of central neuraxis block
 - 8. CNS
 - a) Describe the nervous system changes (including mechanisms) that occur during pregnancy that relate to .
 - (1) emotional state (depression, anxiety)
 - (2) anesthetic requirements for both general and regional anesthesia
- B. Fetal And Placental Physiology
- 1. Embryogenesis
 - a) Describe cellular events in stages of fetal development, from fertilized ovum, through blastocyst, morula
 - 2. Placental development and structure
 - a) Dissect a placenta, identify vessels, cotyledons
 - b) Describe the events, as observed histologically, that lead to the development of the fetal- placental maternal unit
 - 3. Placental dependence on maternal circulation

- a) Draw a schematic of the maternal-fetal-placental unit
 - b) List physiologic or pathophysiologic processes that can be alter placental blood flow. By what mechanism do these processes alter the blood flow?
 4. Placental gas exchange, nutrient transport, drug transfer
 - a) Describe the physiologic parameters that pertain to the transport of matter (nutrients, metabolic waste products, drugs) from mother to fetus and from fetus to mother.
 5. Fetal circulation
 - a) List the major vessels that conduct blood from mother to fetus, and back to mother (include umbilical vein, ductus venosus, foramen ovale, ductus arteriosus, umbilical arteries)
 - b) Describe the time related changes in pregnancy that relate to fetal O₂ delivery and consumption (24 ml/kg/min; 8 ml/kg/min), and CO of the fetus
 6. Fetal evaluation (growth, fluid, positions)
 - a) List clinically used methods to evaluate fetal well being during and prior to the onset of labor. Define IUGR.
 - b) What do the following tests measure: NST, OCT, and biophysical profile? Discuss the clinical implications of positive and negative tests.
 - c) State the indications for FHR monitoring. What factors affect FHR? Define: normal FHR. Define and discuss mechanisms of short term and long term beat-to-beat variability. Define and discuss mechanisms of early decelerations, late decelerations, and variable decelerations. Explain the clinical significance of each of the above-mentioned changes on FHR monitoring. List factors, (including maternally administered drugs) and mechanisms associated with alterations of FHR patterns.
 - d) What are normal fetal blood gas values (arterial and venous) during labor and immediately following delivery? What blood gas values are considered evidence of fetal distress?
- C. Neonatal Physiology
1. What methods are used to assess neonatal well being?
 - a) Discuss APGAR score. Discuss its value to predict prognosis for the newborn. Which maternally administered drugs affect the APGAR score? What values of APGAR indicate a need for neonatal resuscitation?
 - b) Define NBS and ANBS. Explain their value to predict prognosis for the newborn.
 2. Discuss physiologic adaptations to extrauterine life, including circulatory and respiratory changes.

3. Resuscitation of the newborn - NALS protocol. List situations associated with an increased likelihood of need for resuscitation.

III. Pharmacology

A. Local anesthetics (LA)

1. General principles of LA pharmacology
 - a) Compare pharmacokinetics, pharmacodynamics, clinical potencies of bupivacaine, ropivacaine, lidocaine, chloroprocaine.
 - b) Compare potential for placental transfer and fetal ion trapping for bupivacaine, ropivacaine, lidocaine, mepivacaine, and chloroprocaine.
2. Describe criteria for selection of local anesthetics for OB anesthesia and analgesia. Compare advantages & disadvantages of bupivacaine, ropivacaine, lidocaine, chloroprocaine, mepivacaine for EA vs SAB.
3. Describe effects on maternal circulation, uterine tone, uterine blood flow, and FHR of the above-mentioned LA's
 - a) at plasma concentration ranges associated with epidural analgesia and anesthesia?
 - b) in concentration ranges associated with systemic toxicity (during inadvertent intravascular injection)
 - c) when used in combination with vasoconstrictors
4. Describe effects of vasoconstrictors on intensity and duration of anesthesia (EA vs SAB)
5. Discuss the effect of sodium bicarbonate on the onset and duration of EA anesthesia?
6. Describe the systemic toxicity of the above-mentioned LA's on the maternal
 - a) cardiovascular system (HR, CO, SV, SVR, cardiac conduction), including initial, intermediate and late appearing effects
 - b) central nervous system
7. Describe the system toxicity of the above-mentioned LA's
 - a) to fetus and newborn
8. Describe the local neurotoxic effects

B. Agents affecting uterine tone:

1. List agents used in the conduct of anesthesia that produce clinically important alterations of uterine tone. Describe effects of potent inhalation anesthetics and ketamine on uterine tone
2. Tocolytics (and agents that relax uterine smooth muscle):
 - a) List drugs that have been used clinically to produce tocolysis. State the advantages and disadvantages (including toxicities) of using each agent
 - (1) ETOH
 - (2) Mg
 - (3) beta-2 adrenergic agonists.

- b) List the OB-related indications for using TNG. What is the usual starting dose? What side effects occur?
 - 3. Uterotonics (agents that increase uterine tone):
 - a) List drugs that increase uterine tone.
 - b) Compare oxytocin, □methylergonovine and carboprost, regarding indication, dosage, side effect profile. By what mechanism does each increase uterine tone.
- C. Opioids:
 - 1. Compare meperidine, MS, fentanyl, nalbuphine as relates to dosing parameters, efficacy, side effect profiles, and effects on the fetus, when used **parenterally** (IV or IM) to treat labor pain.
 - 2. Compare meperidine, MS, fentanyl and sufentanil as relates to dosing parameters, efficacy, side effect profiles, and effects on the fetus, when given in the **epidural** space for treatment of labor pain.
 - 3. Compare meperidine, MS, fentanyl and sufentanil as relates to dosing parameters, duration, efficacy, side effect profiles, and effects on the fetus, when given via **subarachnoid** injection?
- D. Drug interactions:
 - 1. what are the effects of vasoactive agents on the onset, intensity and duration of sensory and motor effects of LA's ?
 - 2. what are the effects of opioids on the onset, intensity and duration of sensory and motor effects of LA's ?
 - 3. what is the effect of sodium bicarbonate addition to LA's on the onset, intensity and duration of sensory and motor effects of LA's ?

IV. Management of Labor

- A. Physiology of labor and uterine smooth muscle
 - 1. Describe first (active and latent phases), second and third stages of labor, noting events that define each stage (e.g., changes in cervical dilation and effacement), duration of each stage, compare these changes in primiparas vs multiparas
 - 2. Describe effects of uterine contractions on placental exchange and fetal oxygenation
- B. List indications for labor analgesia
- C. Compare effects of IV or IM analgesics vs peridural or subarachnoid agents on duration of each of stages of labor. ADV. Q's: Does epidural anesthesia alter the duration of first stage of labor? second stage of labor? incidence of C-sections? forceps or vacuum deliveries?
- D. What are the effects of labor on maternal hydration, ventilation, hemodynamics
- E. Describe to anatomy of the epidural space
- F. What are the clinical manifestations of uterine hypertonus or hyperstimulation?

V. Anesthetic Techniques For OB:

- A. Compare techniques (inc. drug doses) of providing analgesic / anesthesia for:

1. routine labor and vaginal delivery
 2. vacuum extraction
 3. routine low outlet forceps
 4. trial of forceps
- B. Compare techniques (inc. drug doses) of providing anesthesia for abdominal delivery
1. for non-urgent procedures
 2. for urgent procedures compare the following options
 - a) use of existing labor epidural
 - b) initiating spinal anesthesia
 - c) indications/management of GETA
 - d) maternal and fetal anesthetic risk of urgent or emergent delivery
 3. discuss approaches to fluid management
 4. compare approaches for providing postoperative analgesia
- C. Discuss analgesic / anesthesia approaches for the following:
1. D & C for postpartum hemorrhage
 2. Tubal ligation
 3. D & E

VI. Regional Anesthesia For Obstetrics

- A. Describe anatomy of epidural space
- B. Describe neurological pathways that convey pain information during the first vs second stage of labor
- C. List all regional anesthesia (including nerve blocks and agents) procedures that can produce effective analgesia in the first stage of labor?
- D. List all regional anesthesia procedures produce effective analgesia in the second stage of labor?
- E. List absolute contraindications to regional anesthesia. List relative contraindications.
- F. Describe the hemodynamic effects (BP, HR, SV, CO, SVR) of epidural vs spinal anesthesia.
 1. Compare treatment options for management of hypotension (e.g., ephedrine vs fluids vs phenylephrine)
- G. Describe approaches to managing inadequate regional anesthesia during labor or operative delivery
 1. List options for conversion from labor analgesia to anesthesia for operative delivery, in urgent vs nonurgent settings.
- H. List complications of regional anesthesia and anticipated frequency (include post-dural puncture headache, maternal backache, maternal nerve palsy, epidural abscess or hematoma). Describe approaches to management of each of these complications (post-dural puncture headache, maternal backache, maternal nerve palsy, epidural abscess or hematoma).

VII. General Anesthetics For Obstetrics

- A. List indications for general endotracheal (GETA) anesthesia

- B. What are the ventilatory requirements of parturients (Vt, minute ventilation)
 - C. Compare agents (and doses) for induction and maintenance of anesthesia
 1. Describe effects of each agent on uterine tone and fetal perfusion.
 2. What is the effect on the fetus (APGARS) of induction to delivery interval, and uterine incision to delivery intervals.
 - D. Describe the steps of the difficult airway algorithm
 - E. Display basic knowledge of anesthetic and obstetric management of high-risk pregnancy
- VIII. Resuscitation**
- A. List clinical factors (both fetal and maternal) that are predictive of a need for neonatal resuscitation.
 - B. Describe components of an APGAR score. Describe the relation between APGAR score and a need for neonatal resuscitation Describe indicated actions with each of the following APGAR scores: 2 at one min, 2 at 5 min, 5 at five min.
- IX. Complications of Anesthesia during Pregnancy**
- A. Aspiration pneumonitis: List risk factors for gastric acid aspiration. Do metoclopramide or antacids modify these risks in the parturient? Is this risk present before 12 weeks gestation? Is this risk still present 1 day postpartum?
 - B. PDPH: Explain the relation between needle size and post-dural puncture headache.
 - C. List the four most common neurological complications observed in parturients. What is the incidence of each? Which are caused by OB factors? Which are caused by anesthesia interventions?
- X. Anesthetic Management Of Non-Obstetric Surgery During Pregnancy**
- A. Describe advantages and disadvantages of performing elective operations during the first, second and third trimesters of pregnancy?
 1. Explain precautions that should be taken in each trimester?
 2. When is FHR monitoring indicated? Describe management options when intraoperative FHR monitoring shows fetal bradycardia or decreased FHR variability.
 - B. Describe special anesthetic considerations in parturients who undergo trauma or emergency operations.
 - C. Discuss effects of maternal hypotension, hyperventilation, hypoventilation, blood transfusion on the fetus well being.
- XI. Anesthesia for In Vitro Fertilization Procedures**
- A. Define the terms: IVF, GIFT, ZIFT, TET
 - B. Timing of ultrasonically guided ER after HCG injection.
 - C. List anesthetic options (and preferred agents) for egg retrieval.
 1. List anesthetic agents that are not preferred agents for IVF
 - D. What are complications of the procedure (intra-abdominal bleeding)
 - E. List medications (GnRH agonist) commonly administered to IVF patients? Describe their effects on estradiol levels.
- XII. Ethical Issues**

- A. Discuss the potential for maternal-fetal conflicts of interest (e.g. general anesthesia for STAT cesarean delivery in face of perceived fetal jeopardy)
- B. Demonstrate an understanding of all moral and religious points of view (e.g., Jehovah's Witness patient)
- C. Discuss current gestational age-weight limits for fetal survivability
- D. Discuss informed consent issues

LEVEL 2

I. Manual skills development:

- A. Goal: to master skills, with an emphasis on efficiency. Demonstrate mastery of month 1 skills by:
 - 1. Epidural catheter placement:
 - a) most completed in less than 15 min
 - b) low epidural replacement rate
 - c) low rate of PDPH
 - d) high patient satisfaction rate
 - e) 80% success rate
 - 2. SAB placement
 - a) time target 5 min,
 - b) success rate more than 90%
- B. Performing difficult cases (including high risk parturients)
- C. Learn to perform CSE

II. Anesthetic and Obstetric Management of High-Risk Pregnancy.

- A. For each of the following disease categories:
 - 1. List common obstetric concerns and standard management strategies
 - 2. Describe anesthetic implications of the disease or condition, focusing on maternal and fetal considerations
 - 3. Describe how to assess the severity of the disease and how to determine when a patient's condition warrants ICU care
 - 4. Describe the anesthetic management options for vaginal and cesarean delivery
- B. Hypertensive Disorders of Pregnancy
 - 1. Hypertensive disorders other than PET (chronic hypertension)
 - 2. Preeclampsia / eclampsia
 - a) List the diagnostic criteria
 - b) Discuss the epidemiology
 - c) Discuss the pathophysiology (as a multisystem disease)
 - d) Discuss the pathophysiology of HELLP syndrome
 - e) Discuss the management (medical/obstetric) of preeclampsia, as relates to the following:
 - (1) term vs. preterm fetus
 - (2) mild vs. severe disease

- (3) assessment of fetal well-being
- (4) seizure prophylaxis; magnesium sulfate effects
- (5) antihypertensive medication: discuss choices of medications and reasons for choices
- (6) management of oliguria
- (7) indications for invasive monitoring

C. Multiple gestation

- 1. List and compare risks associated with multiple gestations
- 2. List and compare risks associated with twins vs triplets, quadruplets (as relates to preterm labor, postpartum uterine hemorrhage)

D. Preterm labor

- 1. discuss risks, fetal and maternal, associated with PTL, as relates to fetal morbidity and mortality;
- 2. risks associated with tocolytic therapy

E. Abnormal fetal presentations

F. Antepartum hemorrhage

G. Maternal or fetal infection

H. Endocrine disease

- 1. Diabetes mellitus
 - a) criteria for diagnosis (and classification) during pregnancy
 - b) indications for therapy
 - c) effect of pregnancy (e.g., HPL, progesterone) on diabetes
 - d) effect of DM on mother
 - e) effect of DM on fetus/neonate
 - f) effects of treatment on mother and fetus
- 2. Thyroid disease
 - a) hyperthyroidism
 - (1) diagnosis and clinical presentation
 - (2) effects of treatment on mother and fetus
 - b) hypothyroidism
 - (a) diagnosis and clinical presentation
 - (b) effects of treatment on mother and fetus

I. Substance abuse

- 1. identify risks and complications;
- 2. recommend post-operative pain control strategies
- 3. develop plan to prevent withdrawal complications
 - a) ethanol abuse (evaluate for related medical disorders)
 - b) opioid abuse and barbiturate use
 - c) cocaine abuse

J. Immunological disease (autoimmune, etc.), including HIV infection

K. Neurological disorders (including increased ICP)

- 1. Multiple sclerosis
 - a) diagnosis and clinical manifestations
 - b) effects of pregnancy
- 2. Spinal cord injury

- a) prevention of autonomic hyperreflexia
 - 3. Myasthenia gravis
 - a) diagnosis and clinical manifestations
 - b) effects of pregnancy
 - 4. Seizure disorders
 - a) effects of pregnancy
 - b) Management of seizures
- L. Respiratory disease
 - 1. Asthma
 - a) pathophysiology
 - b) effects of pregnancy on asthma
 - c) effect of asthma on pregnancy
 - 2. ARDS
- M. Cardiovascular diseases: For each cardiac condition, one should be able to:
 - 1. Discuss effect of pregnancy on the cardiac condition;
 - 2. Explain when invasive monitors are needed for delivery and postpartum care
 - 3. Provide consultation to obstetricians and patients on the pathophysiology of cardiac lesions
 - 4. Recommend perioperative management and preferred anesthetic plans for patients with mild to moderate disease
 - 5. Congenital Heart Disease
 - a) left to right shunt
 - b) right to left shunts (Tetralogy of Fallot)
 - c) pulmonary hypertension (Eisenmenger's Syndrome)
 - d) coarctation of aorta
 - 6. IHSS
 - 7. Ischemic Heart Disease
 - 8. Valvular Heart Disease
 - 9. aortic stenosis
 - 10. aortic insufficiency
 - 11. mitral stenosis
 - 12. mitral regurgitation
- N. Hematological or thromboembolic diseases; for each disorder, devise an anesthesia/ analgesia plan based on the coagulation status
 - a) Anemias
 - (1) thalassemias
 - (2) sickle cell disease
 - b) autoimmune thrombocytopenic purpura
 - c) von Willebrand's disease
- O. Morbid obesity
 - a) Physiologic changes related to obesity
 - b) Effect of obesity on pregnancy
- P. Systemic or local infection (including viremia, HIV, CMV, sepsis)
- Q. Malignant hyperthermia

- R. Renal Disease
- S. Liver Disease
- T. Musculoskeletal Disorders
 1. Scoliosis
 2. Rheumatoid arthritis
 3. Spina bifida cystica
 4. Prior back surgery including Harrington rod placement

LEVEL 3

I. Enhance ability to act as consultant

- A. Formulate anesthesia plans for high risk parturients,
 - a) prior to onset of labor
 - b) when patient is admitted to labor floor
 - c) for problems that arise following delivery of the baby

II. Develop critical evaluation skills:

- A. Discuss limitations of our knowledge in OB anesthesia as pertains to the following issues;
 1. Perinatal pharmacology and teratogenesis: limitations of animal studies (species differences; use of GA and chronic instrumentation)
 2. Assessment of human placental function (radioactive Xe CI technique vs Doppler).
 3. Pharmacokinetic factors influencing placental transfer of drugs;
 - a) limitations of UV/MV ratio (e.g., single time point, not steady state or equilibrium measurements)
 4. Neonatal assessment (APGARS insensitive)
 5. Methodologies that are central to major concepts in OB anesthesia :
 - a) Describe methods and limitations of each method used for determining uterine blood flow or uteroplacental blood flow
 - (a) $^{133}\text{Xe IV}$ 1 mrad Xe is freely diffusible and cleared through lung; scintillation detector over placenta
 - (b) Doppler 4 MHz probe (systolic peak to diastolic trough of wave reflects vasc resistance distal to measurement)

III. Development of management & leadership skills

- A. Demonstration of independence
- B. Development of communication skills
- C. Demonstration of leadership and management (assessed via performance as first call)
- D. Obstetric resident and fellow scheduling

- E. Supervision of junior residents
 - F. Team leader coordination and distribution of resources
- IV. Teaching skills**
- A. Expanded role in lectures and conferences (moderator vs presenter)
 - B. Introduction to clinical research
 - C. Focus on bedside teaching

